

What is claimed is:

- 1 1. An antenna interface circuit to provide an interface between a packaged  
2 microelectronic device and an antenna, comprising:  
3 at least one of the following on one or more substrates: metallization forming a  
4 power amplifier impedance transformer, metallization forming a low noise amplifier  
5 input matching circuit, and metallization forming a duplexer to couple an external  
6 transmitter and an external receiver to a common antenna; and  
7 at least one electrical terminal to couple said antenna interface circuit to a  
8 microelectronic device package.
- 1 2. The antenna interface circuit of claim 1, wherein:  
2 said at least one electrical terminal is for direct connection to one or more  
3 corresponding terminals on a side of the microelectronic device package that has a  
4 microelectronic die mounted thereto.
- 1 3. The antenna interface circuit of claim 1, further comprising:  
2 at least one electrical terminal to couple said antenna interface circuit to an  
3 external antenna.
- 1 4. The antenna interface circuit of claim 1, further comprising:  
2 metallization forming an integrated antenna.
- 1 5. The antenna interface circuit of claim 1, wherein:  
2 said antenna interface circuit includes multiple metallization layers.
- 1 6. The antenna interface circuit of claim 5, comprising:  
2 metallization forming a power amplifier impedance transformer on one  
3 metallization layer and metallization forming a low noise amplifier input matching  
4 circuit on another, different metallization layer.

- 1 7. The antenna interface circuit of claim 5, wherein:  
2 at least one of said multiple metallization layers includes a ground plane.
- 1 8. The antenna interface circuit of claim 1, wherein:  
2 said antenna interface circuit is flexible.
- 1 9. The antenna interface circuit of claim 1, wherein:  
2 said at least one electrical terminal includes a ball grid array (BGA).
- 1 10. The antenna interface circuit of claim 1, further comprising:  
2 metallization forming at least one radio frequency choke to couple a transistor  
3 within the packaged microelectronic device to a power supply.
- 1 11. An antenna interface circuit to provide an interface between a packaged  
2 microelectronic device and an antenna, comprising:  
3 first metallization forming a power amplifier impedance transformer, second  
4 metallization forming a low noise amplifier input matching circuit, and third  
5 metallization forming a duplexer to couple an external transmitter and an external  
6 receiver to a common antenna, said first metallization being connected to said third  
7 metallization and said second metallization being connected to said third metallization,  
8 wherein said first, second, and third metallizations are on one or more substrates;  
9 at least one electrical terminal to couple said first metallization to a  
10 microelectronic device; and  
11 at least one electrical terminal to couple said second metallization to the  
12 microelectronic device.
- 1 12. The antenna interface circuit of claim 11, further comprising:  
2 at least one electrical terminal to connect said third metallization to an external  
3 antenna.

1 13. The antenna interface circuit of claim 11, further comprising:  
2 fourth metallization, connected to said third metallization, forming an integrated  
3 antenna.

1 14. The antenna interface circuit of claim 11, wherein:  
2 said antenna interface circuit includes multiple metallization layers, wherein  
3 said first metallization is located on a first metallization layer and said second  
4 metallization is located on a second, different metallization layer.

1 15. The antenna interface circuit of claim 14, further comprising:  
2 a ground plane located on a third metallization layer, said third metallization  
3 layer being located between said first metallization layer and said second metallization  
4 layer.

1 16. The antenna interface circuit of claim 11, wherein:  
2 said antenna interface circuit is flexible.

1 17. A system comprising:  
2 a microelectronic device including: (a) a package having an upper side and a  
3 lower side, and (b) at least one microelectronic die having wireless circuitry therein  
4 mounted on said upper side of said package, wherein said lower side of said package  
5 includes a plurality of terminals to couple said package to a circuit board and said upper  
6 side of said package includes at least one terminal to provide communication with an  
7 external antenna; and  
8 an antenna interface circuit to provide an interface between said microelectronic  
9 device and an antenna, said antenna interface circuit having at least one terminal that is  
10 connected to said at least one terminal on said upper side of said package.

1 18. The system of claim 17, wherein:  
2 said antenna interface circuit includes power amplifier impedance transformer  
3 circuitry.

1 19. The system of claim 17, wherein:  
2 said antenna interface circuit includes low noise amplifier input matching  
3 circuitry.

4 20. The system of claim 17, wherein:  
5 said antenna interface circuit includes duplexer circuitry to allow a wireless  
6 transmitter and a wireless receiver within said microelectronic device to share a  
7 common antenna.

1 21. The system of claim 17, wherein:  
2 said antenna interface circuit includes power amplifier impedance transformer  
3 circuitry, low noise amplifier input matching circuitry, and duplexer circuitry to allow a  
4 wireless transmitter and a wireless receiver within said microelectronic device to share  
5 a common antenna.

1 22. The system of claim 17, wherein:  
2 said antenna interface circuit includes multiple metallization layers.

1 23. The system of claim 22, wherein:  
2 said antenna interface circuit includes power amplifier impedance transformer  
3 circuitry on a first metallization layer and low noise amplifier input matching circuitry  
4 on a second metallization layer, wherein said second metallization layer is different  
5 from said first metallization layer.

1 24. The system of claim 17, wherein:  
2 said antenna interface circuit includes at least one antenna integrated therein.

1 25. The system of claim 17, wherein:  
2 said antenna interface circuit is coupled to an external antenna.

1 26. The system of claim 17, wherein:  
2 said at least one microelectronic die is mounted on said upper side of said  
3 package using flip chip techniques.

1 27. The system of claim 17, wherein:  
2 said plurality of terminals on said lower side of said package includes at least  
3 one of: a ball grid array (BGA), a pin grid array (PGA), and a land grid array (LGA).

1 28. The system of claim 17, wherein:  
2 said antenna interface circuit is flexible.

1 29. A system comprising:  
2 a patch antenna; and  
3 an antenna interface circuit to provide an interface between a microelectronic  
4 device and said patch antenna, said antenna interface circuit including:  
5 first metallization forming a power amplifier impedance transformer,  
6 second metallization forming a low noise amplifier input matching circuit, and  
7 third metallization forming a duplexer to couple an external transmitter and an  
8 external receiver to said patch antenna, said first metallization being connected  
9 to said third metallization and said second metallization being connected to said  
10 third metallization, wherein said first, second, and third metallizations are on  
11 one or more substrates;  
12 at least one electrical terminal to couple said first metallization to a  
13 microelectronic device; and  
14 at least one electrical terminal to couple said second metallization to the  
15 microelectronic device.

1 30. The system of claim 29, wherein:  
2 said antenna interface circuit includes multiple metallization layers, wherein  
3 said first metallization is located on a first metallization layer and said second  
4 metallization is located on a second, different metallization layer.

1 31. The system of claim 30, further comprising:  
2 a ground plane located on a third metallization layer of said antenna interface  
3 circuit, said third metallization layer being located between said first metallization layer  
4 and said second metallization layer.

1 32. The system of claim 29, wherein:  
2 said antenna interface circuit is flexible.

1 33. A microelectronic device comprising:  
2 a package having an upper side and a lower side; and  
3 at least one microelectronic die having wireless circuitry therein mounted to  
4 said upper side of said package;  
5 wherein said lower side of said package includes a plurality of terminals to  
6 couple said package to a circuit board and said upper side of said package includes at  
7 least one terminal to couple said microelectronic device to an external antenna.

1 34. The microelectronic device of claim 33, wherein:  
2 said at least one microelectronic die includes a die having both digital  
3 processing circuitry and wireless transceiver circuitry located therein.

1 35. The microelectronic device of claim 33, wherein:  
2 said at least one microelectronic die is mounted to said upper side of said  
3 package using flip chip techniques.

1 36. The microelectronic device of claim 33, wherein:  
2 said package includes power amplifier impedance transformer circuitry.

1 37. The microelectronic device of claim 36, wherein:  
2 said package includes low noise amplifier input matching circuitry.

1 38. The microelectronic device of claim 37, wherein:  
2 said package includes duplexer circuitry to allow a wireless transmitter and a  
3 wireless receiver within said microelectronic device to share a common external  
4 antenna.

1 39. The microelectronic device of claim 33, wherein:  
2 said at least one terminal on said upper side of said package includes at least  
3 one terminal to connect said microelectronic device to an external power amplifier  
4 impedance transformer.

1 40. The microelectronic device of claim 39, wherein:  
2 said at least one terminal on said upper side of said package includes at least  
3 one terminal to connect said microelectronic device to an external low noise amplifier  
4 input matching circuit.

1 41. A microelectronic device comprising:  
2 a package having an upper side and a lower side;  
3 at least one microelectronic die having wireless circuitry therein mounted to  
4 said upper side of said package, wherein said lower side of said package includes a  
5 plurality of terminals to couple said package to a circuit board and said upper side of  
6 said package includes at least one terminal to couple said microelectronic device to an  
7 external antenna; and  
8 an antenna circuit coupled to said at least one terminal on said upper side of said  
9 package, said antenna circuit including at least one microstrip antenna element.

1 42. The microelectronic device of claim 41, wherein:  
2 said at least one microstrip antenna element includes a patch element.

1 43. The microelectronic device of claim 41, wherein:  
2 said antenna circuit is flexible.